3JH4E

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3JH4E

Engine Specifications

Parameter	Data
Configuration	4-cycle, Vertical, Water-Cooled Diesel
Crankshaft Rotation (Viewed from Stern)	Counterclockwise
Combustion System	Direct Injection
Aspiration	Naturally Aspirated
Number of Cylinders	3
Bore x Stroke	88 mm x 90 mm (3.47 in. x 3.55 in.)
Displacement	1.642 L (100.2 cu in.)
Continuous Rating Output at Crankshaft (at 2907 rpm)	26.7 kW* (36.3 hp metric)*
Brake Mean Effective Pressure (Continuous Rating Output)	0.67 MPa 6.80 kgf/cm^2 (97.18 psi)
Piston Speed (Continuous Rating Output)	8.7 m/sec. (28.54 ft/sec.)
Maximum Output at Crankshaft (at 3000 rpm)	29.4 kW* (40 hp metric)* or 28.7 kW** (39 hp metric)**
Brake Mean Effective Pressure (Maximum Output)	0.72 MPa 7.3 kgf/cm^2 (104.43 psi)
Piston Speed (Maximum Output)	9.0 m/sec. (29.53 ft/sec.)
High Idling Speed	3325 ± 25 rpm
Idling Speed	800 ± 25 rpm
Firing Order	240° 240° 240° 1 - 3 - 2 - 1
Starter Motor	DC 12 V, 1.4 kW
Alternator	DC 12 V, 80A DC12 V, 60A - Option

Parameter	Data
Minimum Battery Capacity	DC 12 V, 80 Ah
Cooling System	Fresh water cooling by centrifugal fresh water pump and rubber impeller seawater pump
Coolant Capacity (Engine)	4.5 L (4.76 qt)
Coolant Recovery Tank Capacity	0.8 L (0.85 qt)
Engine Lubrication System	Forced lubrication with trochoid pump
Engine Oil Capacity at 8° Rake Angle (Effective / Maximum)	1.1 / 5.0 L (1.16 / 5.28 qt)
Engine Oil Capacity at 0° Rake Angle (Effective / Maximum)	1.2 / 5.5 L (1.27 / 5.81 qt)
Dry Weight (with KM35P)	185 kg (408 lb)
Dry Weight (with KM35A)	186 kg 410 lb)
Dry Weight (with SD40 / SD50)	213 kg (470 lb)
Recommended Installation Rake Angle	KM35P: 8°
	KM35A: 0°
	SD40 / SD50: 0°
Maximum Installation Rake Angle	KM35P: 15°
	KM35A: 8°

Notes:

1. Rating condition:
   * Fuel temperature: 25°C at fuel pump inlet ISO 3046-1
   ** Fuel temperature: 40°C at fuel pump inlet ISO 8665
   Fuel density: 0.842 g/cm^3 at 15°C
2. 1 HP (hp metric) = 0.7355 kW

Marine Gear / Sail Drive Specifications

Use either KM35A or KM35P marine gear or SD50 sail drive with the 3JH4E engine. The KM35A and KM35P marine gears and the SD50 sail drive has a mechanical cone clutch.

KM35A

Parameter	Data
Reduction Ratio (Ahead)	2.33 / 2.64
Reduction Ratio (Astern)	3.04
Marine Gear Oil Capacity (Effective / Maximum)	0.15 / 0.65 L (0.16 / 0.69 qt)
Propeller Rotation (Viewed from Stern)	Clockwise
Dry Weight (without Engine)	13 kg (29 lb)

KM35P

Parameter	Data
Reduction Ratio (Ahead)	2.36 / 2.61
Reduction Ratio (Astern)	3.16
Marine Gear Oil Capacity (Effective / Maximum)	0.05 / 0.5 L (0.052 / 0.53 qt)
Propeller Rotation (Viewed from Stern)	Clockwise
Dry Weight (without Engine)	12 kg (27 lb)

SD40 / SD50

Parameter	Data
Reduction Ratio (Ahead)	2.32
Reduction Ratio (Astern)	2.32
Sail Drive Oil Capacity Standard	2.2 L (2.3 qt)
Sail Drive Oil Capacity Standard - Old Style SD40	1.8 L (1.9 qt)
Sail Drive Oil Capacity Long-Reach - Extension 58	2.35 L (2.48 qt)
Sail Drive Oil Capacity Long-Reach - Extension 100	2.45 L (2.59 qt)
Propeller Rotation (Viewed from Stern)	Counterclockwise or Clockwise
Dry Weight (without Engine)	39 kg (86 lb)

Fuel System Specifications

Parameter	Data
Maximum Fuel Feed Pump Suction Head	0.5 m (19.69 in.)
Maximum Fuel Feed Pump Discharge Volume (Engine at 3000 rpm)	9.2 L/min. (2.44 gal/min.)
Maximum Fuel Feed Pump Discharge Pressure (Engine at 3000 rpm)	12.73 kPa (1.85 psi)
Fuel Inlet Pipe Connector Outer Diameter	8 mm (0.315 in.)
Fuel Return Pipe Connector Outer Diameter	8 mm (0.315 in.)
Fuel Consumption at Continuous Rated Output	7.8 L/hr (2.06 gal/hr)

Cooling System Specifications

Parameter	Data
Maximum Seawater Pump Suction Head	0.5 m (19.7 in.)
Seawater Inlet Pipe Connector Outer Diameter	26 mm (6.87 in.)
Thermostat Operating Temperature (Full Open)	90°C (194°F)
Thermostat Operating Temperature (Opening)	76.5°C (169.7°F)
Maximum Overflow Pipe Length (Coolant Recovery Tank to Filler Cap)	1.0 m (39.37 in.)
Maximum Overflow Pipe Outer Diameter (Coolant Recovery Tank to Filler Cap)	9 mm (0.355 in.)
Water Heater Tank Connector Thread Size	RC 3/8

Air Intake and Exhaust Specifications

Parameter	Data
Exhaust Pipe Outer Diameter Connection	76.2 mm (3.0 in.)
Minimum Engine Room Fresh Air Exchanges (Ventilator Capacity)	6.0 cu m/min. (212.0 cu in./min.)
Maximum Back Pressure (measured within 250 mm [9.8 in.] of exhaust manifold inlet)	1500 mmAq 14.7 kPa (0.15 kgf/cm^2)
Maximum Output Exhaust Temperature (measured within 250 mm [9.8 in.] of exhaust manifold inlet)	650°C (1202°F)
Maximum Turbocharger Boost Pressure	-
Maximum Engine Room Ambient Temperature	60°C (140°F)

Alarm System Specifications

Parameter	Data
Coolant Alarm Switch Operating Temperature	ON: 97 - 103°C (206.6 - 217.4°F) OFF: 90 - 97°C (194 - 206.6°F)
Engine Oil Alarm Switch Operating Pressure	9.8 - 29.4 kPa (1.43 - 4.27 psi)

Engine Outline with KM35A

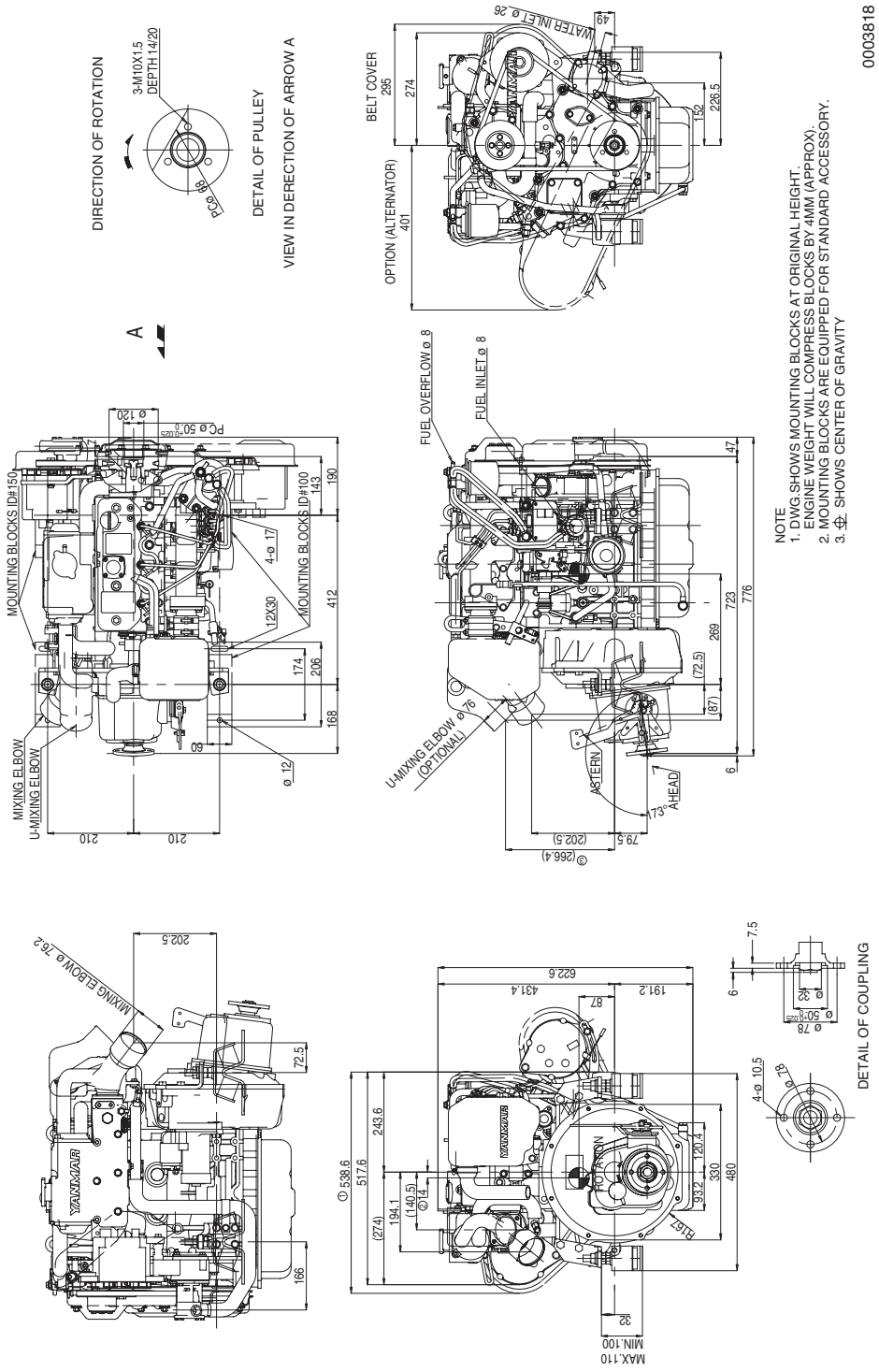


Figure - 1

Unit: mm

Engine Outline with KM35P

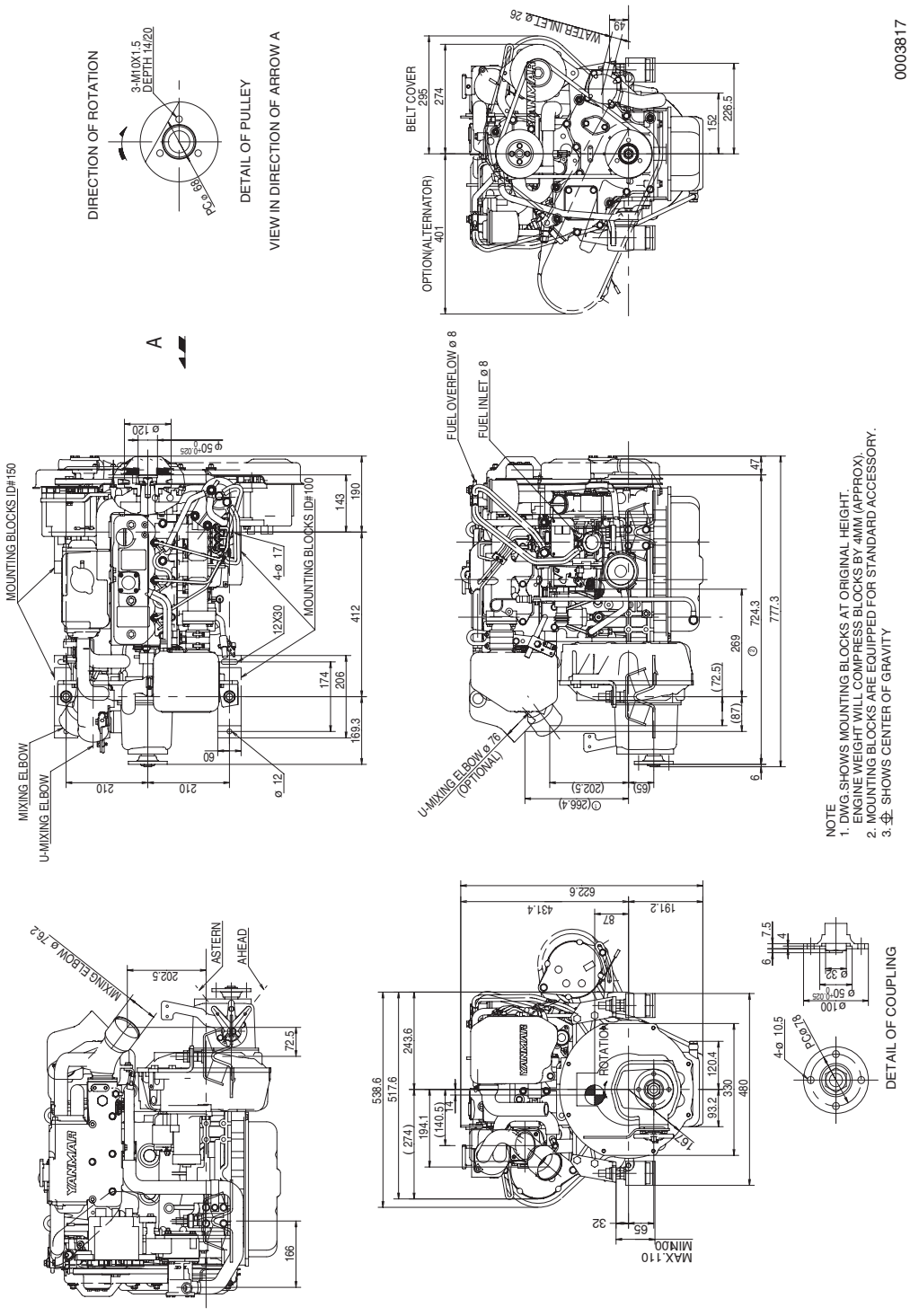


Figure - 2

Unit: mm

Engine Outline with SD50

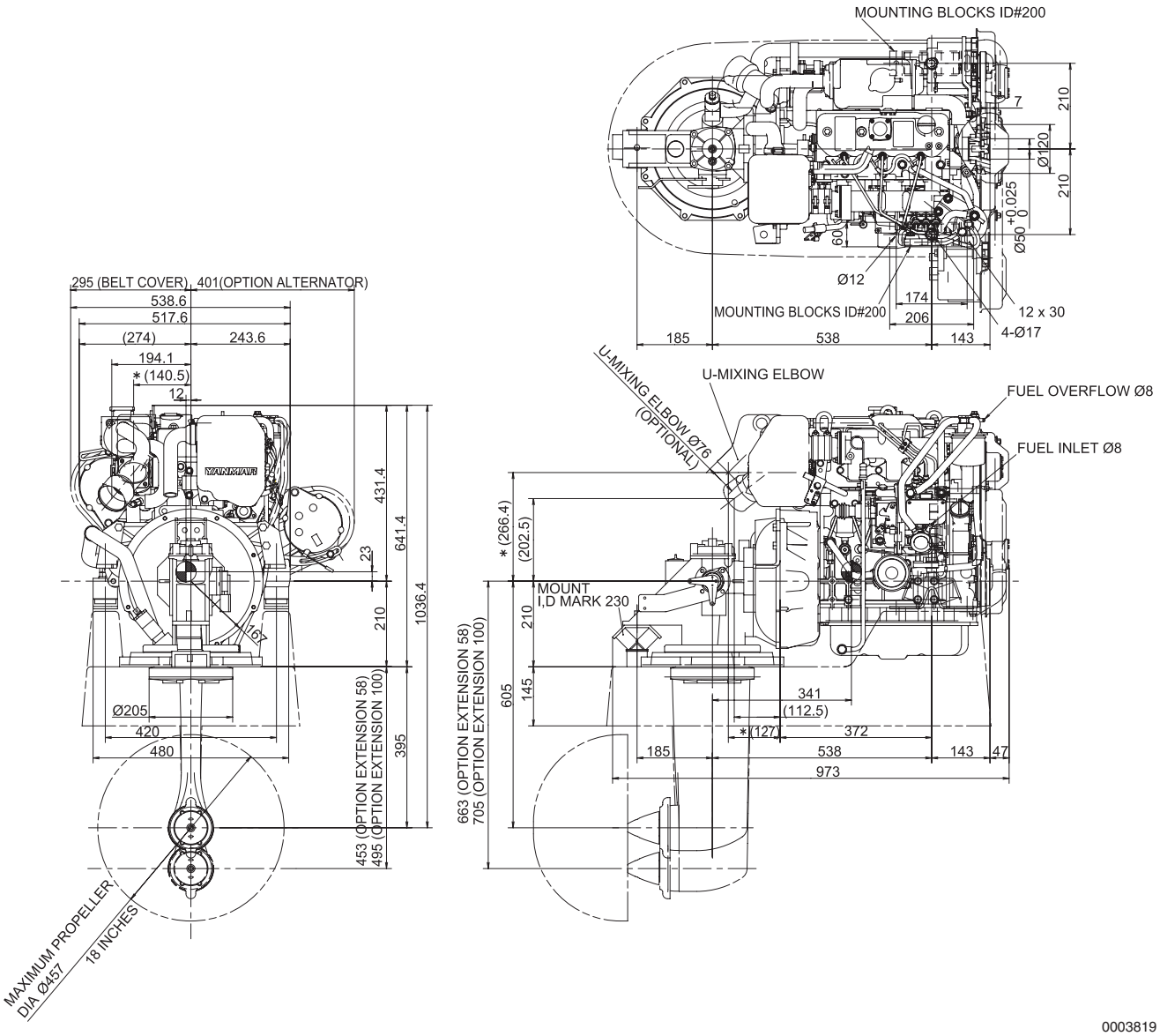


Figure - 3

Notes:

1. Drawing shows mounting blocks at original height.
2. Engine weight will compress blocks by approximately 4.0 mm (0.16 in.).
3. Mounting blocks are equipped for standard accessory.
4. ⌖shows center of gravity.
5. Unit: mm

Flywheel / Flywheel Housing Dimensions

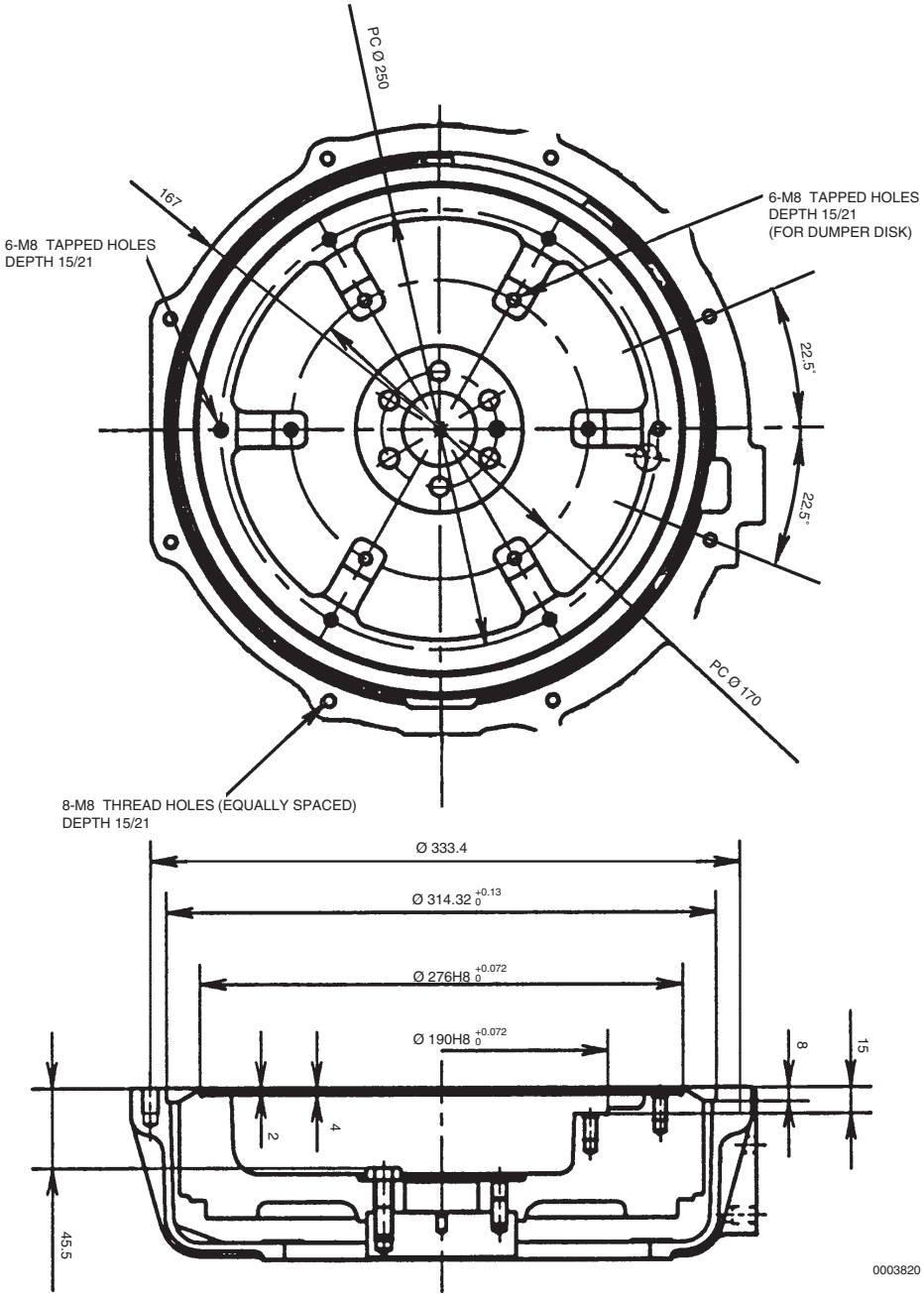


Figure - 4

Unit: mm

Piping Diagrams

KM35A / KM35P

Marks of piping	
RH	Rubber hose
SGP STS	Steel pipe
C1201T	Copper pipe
	Screw joint (Union)
	Flange joint
	Eye joint
	Insertion joint
	Drill hole
	Cooling fresh water piping
	Cooling sea water piping
	Lube oil pipe
	Fuel oil pipe

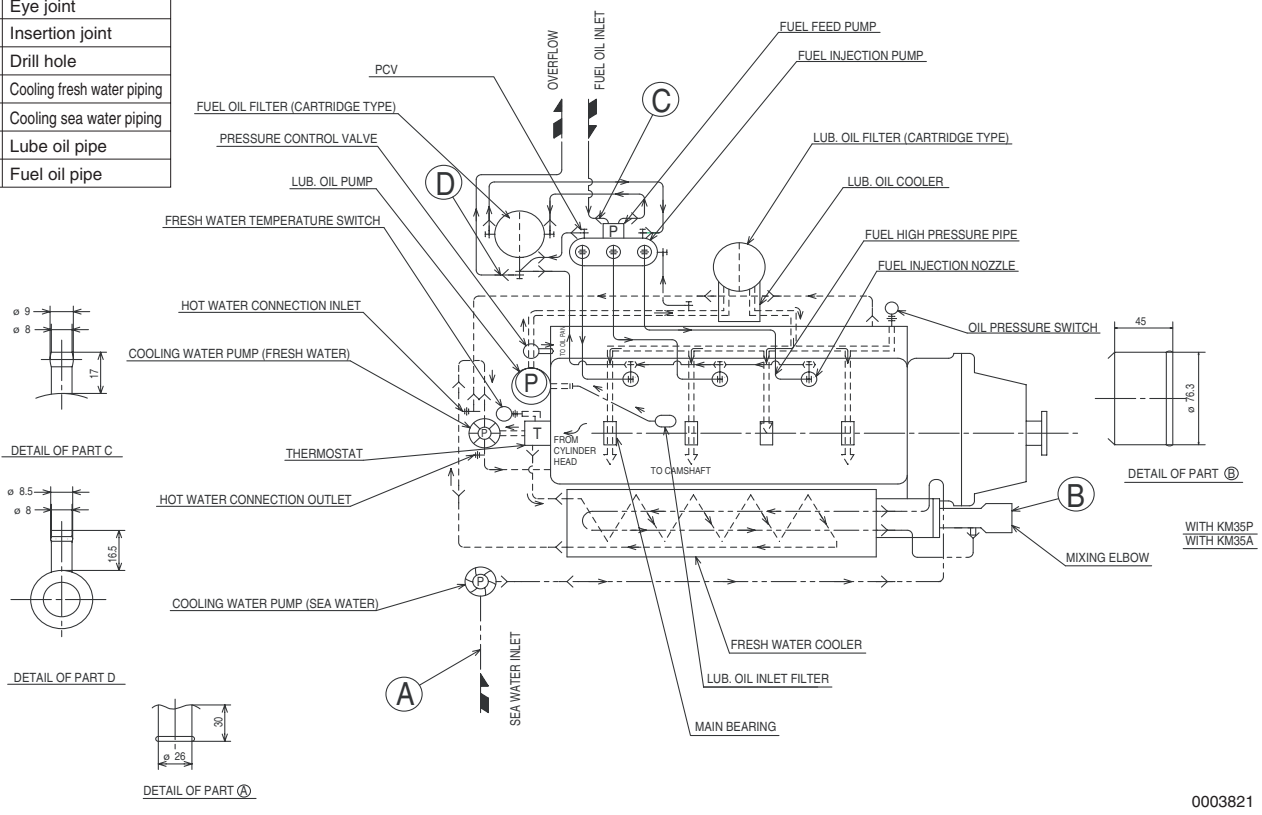


Figure - 5

Notes:

1. Steel pipe: OD x wall thickness - rubber hose: ID x wall thickness.
2. Rubber fuel hoses meet EN/ISO7840. Details follow specification KSC4.7
3. Unit: mm

SD40 / SD50

Marks of piping	
RH	Rubber hose
SGP STS	Steel pipe
C1201T	Copper pipe
	Screw joint (Union)
	Flange joint
	Eye joint
	Insertion joint
	Drill hole
	Cooling fresh water piping
	Cooling sea water piping
	Lube oil pipe
	Fuel oil pipe

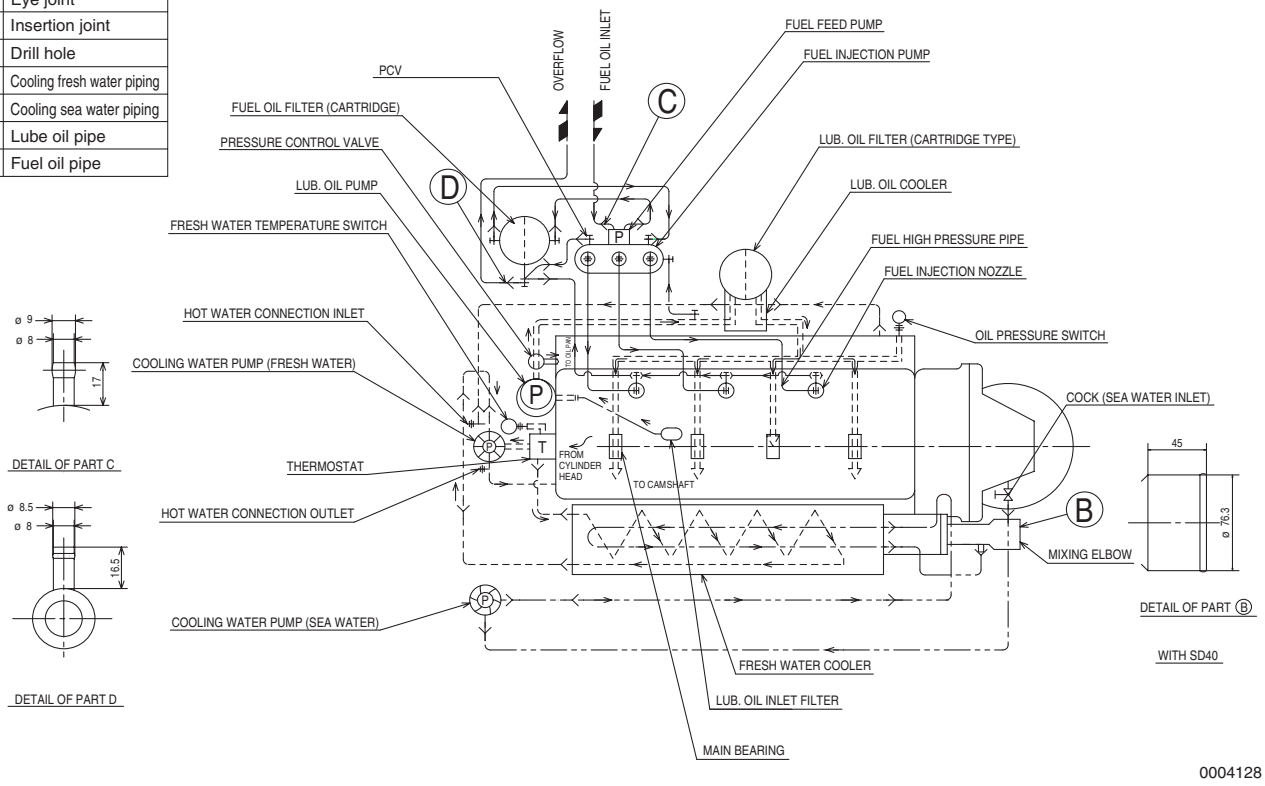


Figure - 6

Notes:

1. Steel pipe: OD x wall thickness - rubber hose: ID x wall thickness.
2. Rubber fuel hoses meet EN/ISO7840. Details follow specification KSC4.7
3. Unit: mm

Electrical System

Starter Specifications

Parameter	Data
Yanmar Code	129608-77010
Starter Model	S114-817A (Hitachi)
Voltage	12 V
Output	1.4 kW (1.9 hp metric)
Direction of Rotation (Viewed from Pinion Side)	Clockwise
Weight	3.0 kg (6.6 lb)
Rating	30 seconds
Number of Pinion Teeth	11
No-load Terminal Voltage	11 V
No-load Maximum Current	90A (maximum)
No-load rpm	2700 (minimum)
Loaded Terminal Voltage	8.4 V
Loaded Maximum Current	250A
Loaded Torque	8.3 N·m (0.85 kgf-m) (6.12 lbf-ft) minimum
Loaded rpm	1000 (minimum)

Performance Curve for Starter

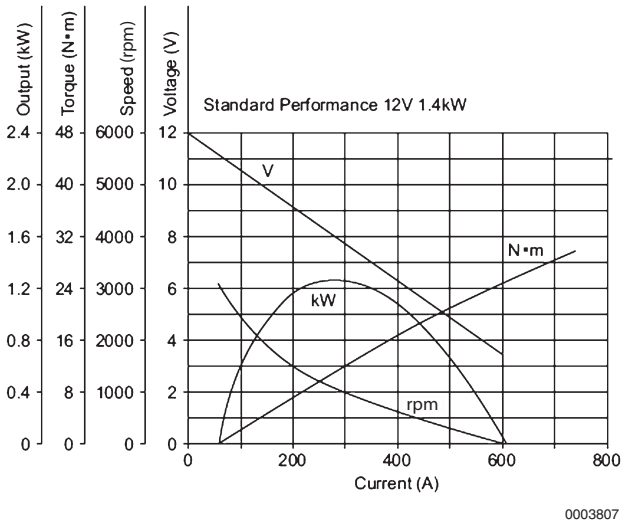
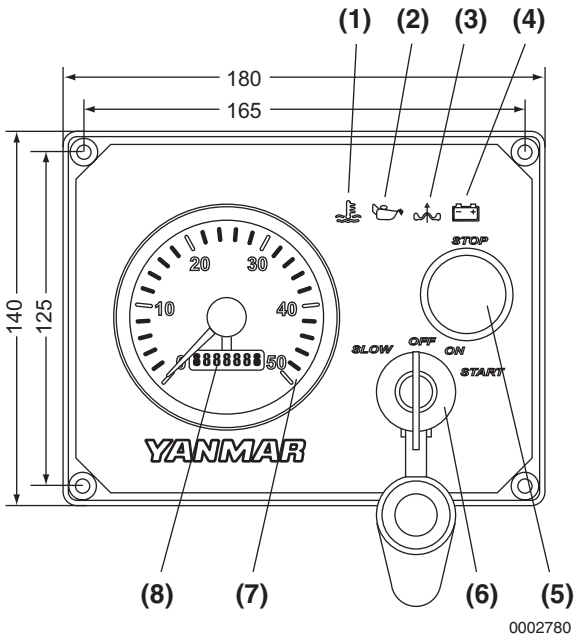


Figure - 7

Panels

The 3JH4E uses a new B-type (VDO) panel and a C-type (VDO) panel.

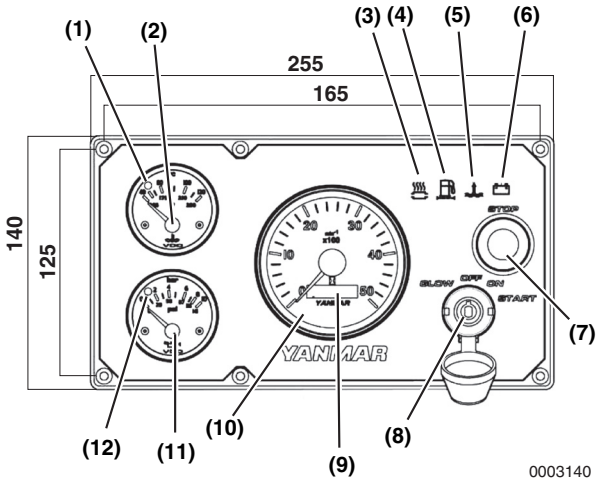
B-Type (VDO)



1. Coolant High Temperature Alarm Lamp
2. Engine Oil Pressure Alarm Lamp
3. Water in Drive Alarm Lamp
4. Battery Low Charge Alarm
5. Engine Stop
6. Key Switch
7. Tachometer
8. Hourmeter

Figure - 8

C-Type (VDO)



1. Coolant High Temperature Alarm Lamp
2. Coolant Temperature Gauge
3. Seawater Flow Alarm Lamp
4. Water in Fuel Alarm Lamp
5. Water in Sail Drive Alarm Lamp
6. Battery Low Charge Alarm Lamp
7. Engine Stop Pushbutton
8. Starter Key Switch
9. Hourmeter
10. Tachometer
11. Engine Oil Pressure Gauge
12. Engine Oil Pressure Alarm Lamp

Figure - 9

Standard Alternator Data

Parameter	Data
Yanmar Code	119573-77201
Alternator Model	LR180-03C
IC Regulator Model	TR1Z-63
Battery Voltage	12 V
Nominal Output	12 V / 80A
Earth Polarity	Negative Earth
Direction of Rotation (Viewed from Pulley End)	Clockwise
Weight	5.8 kg (12.8 lb)
Rated Speed	5000 rpm
Operating Speed	1200 - 9000 rpm
Speed for 13.5 V at 20°C (68°F)	1200 rpm or less
Output Current for 13.5 V	75A or more at 5000 rpm
Voltage Regulation at 20°C (68°F), Voltage Gradient, -0.01 V/°C	14.5 ± 0.3 V

Performance Curve for 80A Alternator

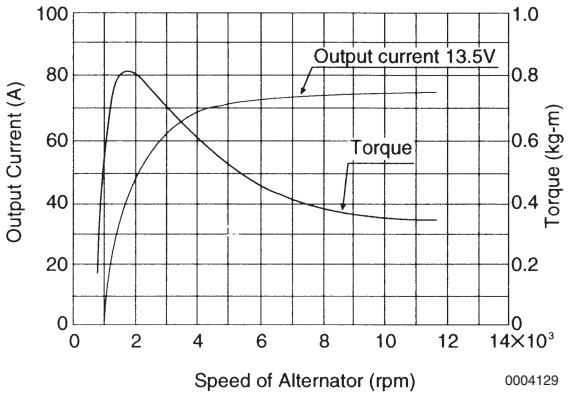


Figure - 10

Optional Alternator Data

Parameter	Data
Yanmar Code	128271-77200
Alternator Model	LR160-741
IC Regulator Model	SA-A
Battery Voltage	12 V
Nominal Output	12 V / 60A
Earth Polarity	Negative Earth
Direction of Rotation (Viewed from Pulley End)	Clockwise
Weight	4.2 kg (9.2 lb)
Rated Speed	5000 rpm
Operating Speed	1050 - 18,000 rpm
Speed for 13.5 V at 20°C (68°F)	5000 rpm
Output Current for 13.5 V	56A or more at 5000 rpm
Voltage Regulation at 20°C, Voltage Gradient, -0.01 V/°C	14.4 ± 0.3 V

Performance Curve for 60A Alternator

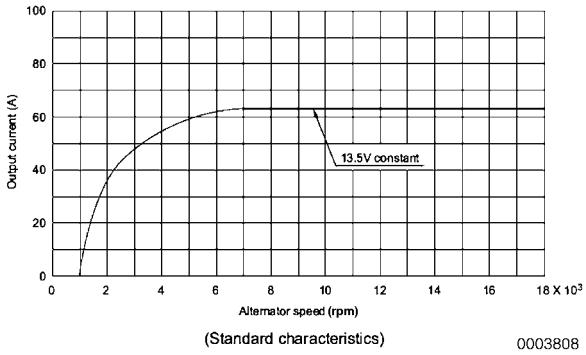


Figure - 11

Wiring Diagrams

Panel: B and B Type (VDO)

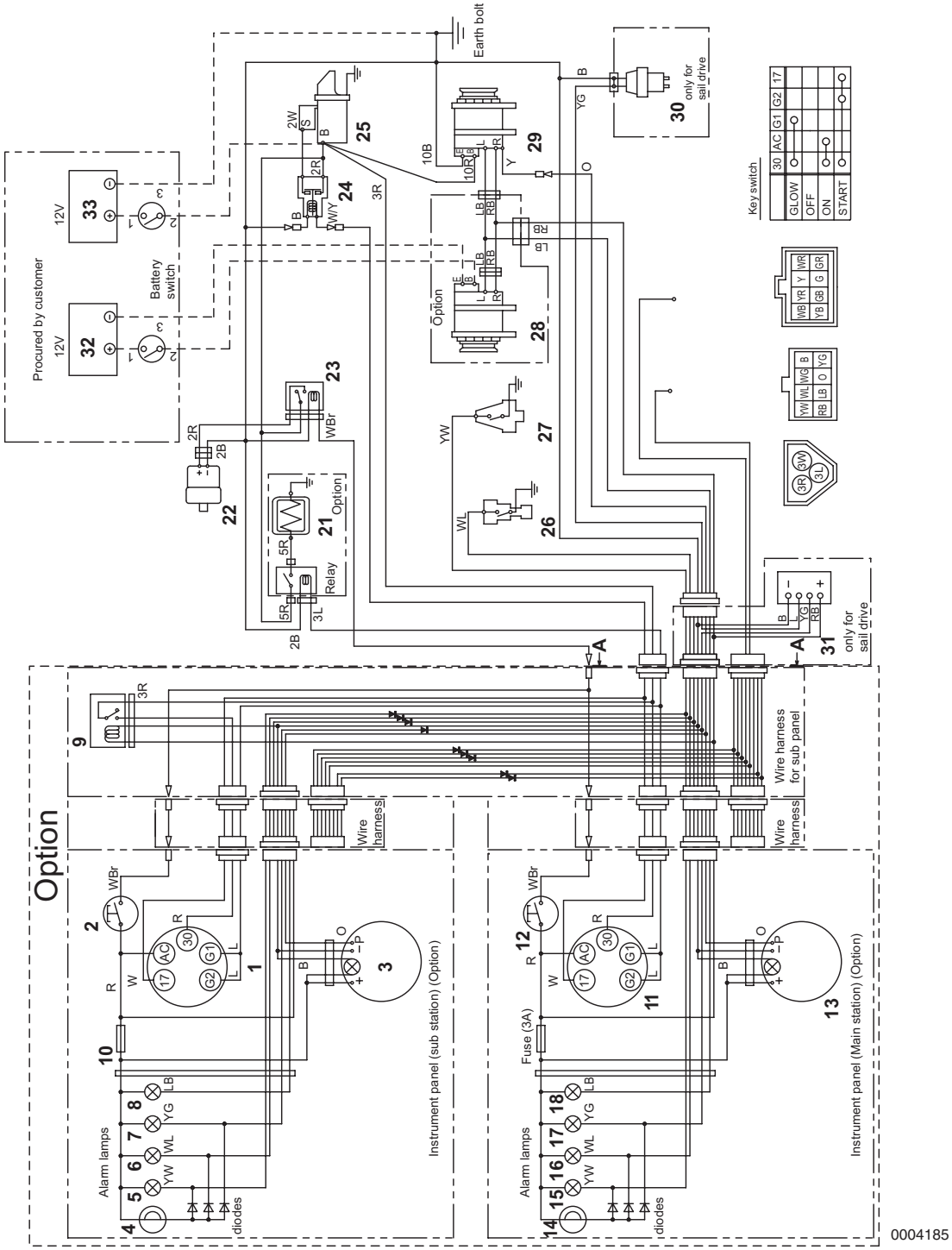


Figure - 12

3JH4E / 4JH4E - B-Type Instrument Panel

Color Coding	Description
R	Red
B	Black
W	White
L	Blue
RB	Red / Black
LB	Blue / Black
YW	Yellow / White
YB	Yellow / Black
YG	Yellow / Green
WL	White / Blue
WB	White / Black
WG	White / Green
GR	Green / Red
O	Orange
WBr	White / Brown

1	Starter Switch
2	Stop Switch
3	Tachometer / Hourmeter
4	Buzzer
5	Lubricating Oil Low Pressure Alarm
6	Coolant High Temperature Alarm
7	Water in Sail Drive Seal Alarm
8	Battery Low Charge Alarm
9	Relay (for 2 station - Optional)
10	Fuse (3A)
11	Starter Switch
12	Stop Switch
13	Tachometer / Hourmeter
14	Buzzer
15	Lubricating Oil Low Pressure Alarm
16	Coolant High Temperature Alarm
17	Water in Sail Drive Seal Alarm
18	Battery Low Charge Alarm
19	-
20	-
21	Air Heater (Optional)
22	Engine Stop Solenoid
23	Stop Relay
24	Starter Relay
25	Starter
26	Coolant High Temperature Switch
27	Lubricating Oil Low Pressure Switch
28	Alternator (Optional)
29	Alternator
30	Water In Sail Drive Seal Sensor (on Sail Drive)
31	Water in Sail Drive Seal Sensor Amplifier (Sail Drive Only)
32	Battery (Optional)
33	Battery
34	-
35	-

Panel: B and C Type (VDO)

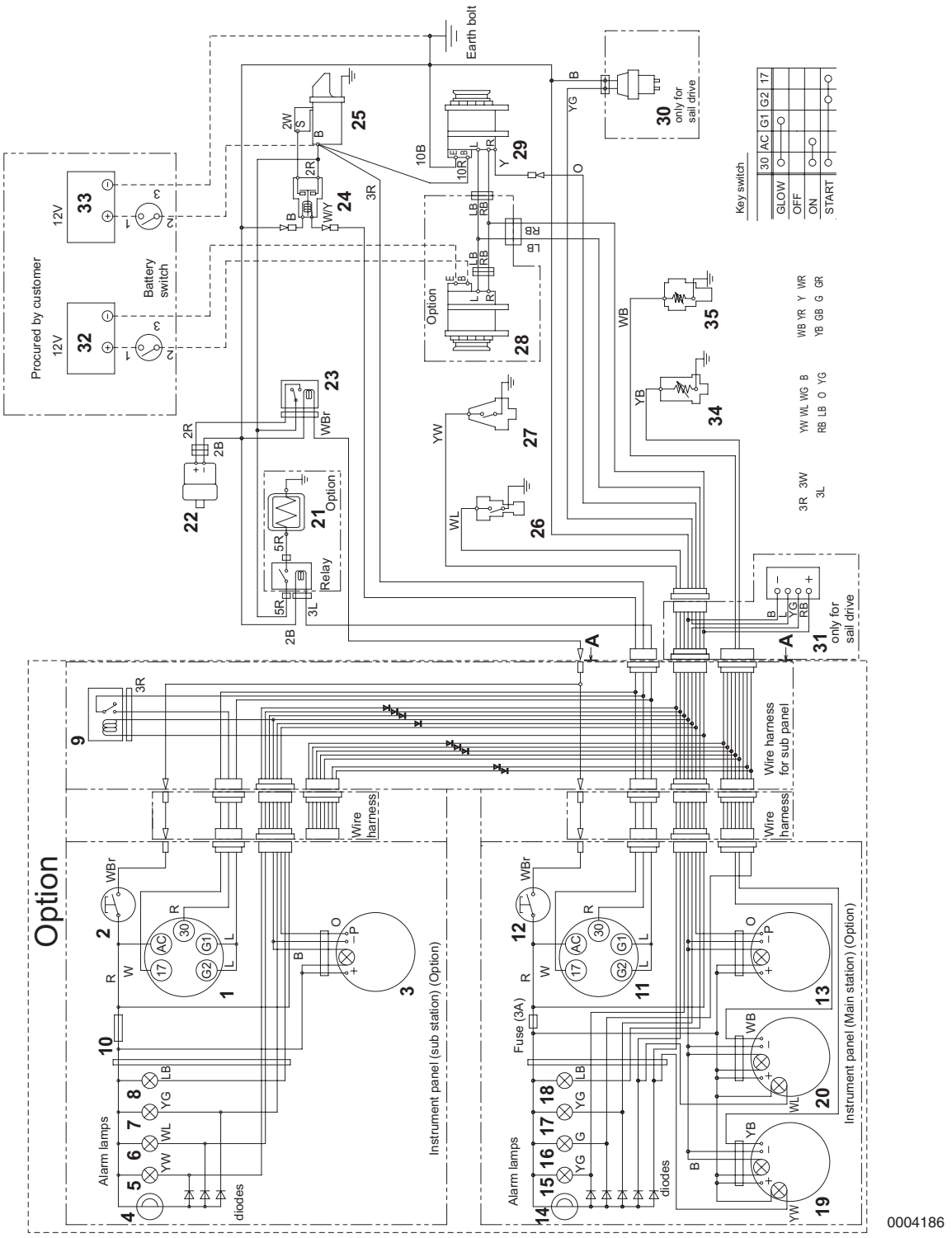


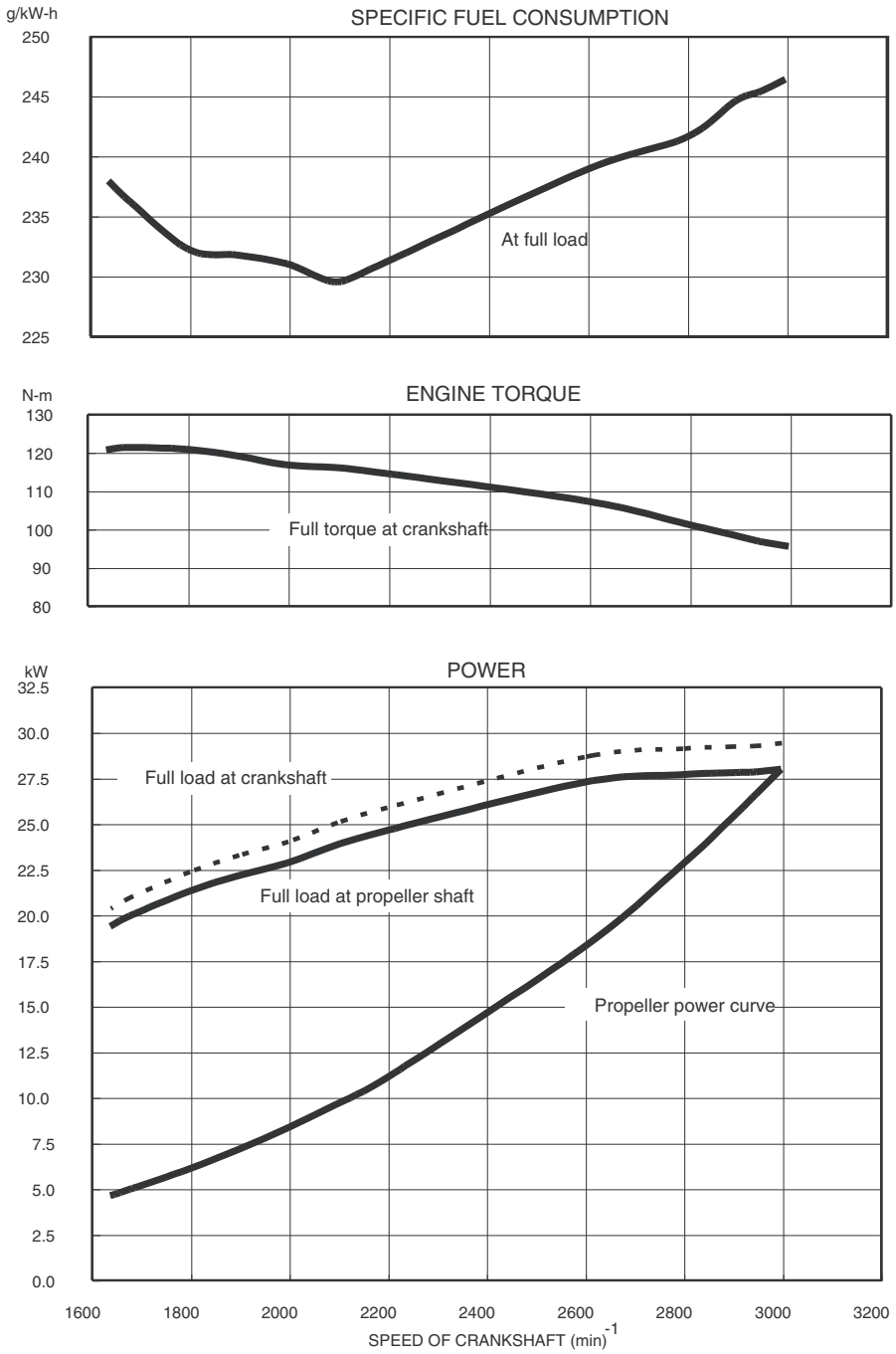
Figure - 13

3JH4E / 4JH4E - C-Type Instrument Panel

Color Coding	Description
R	Red
B	Black
W	White
L	Blue
RB	Red / Black
LB	Blue / Black
YW	Yellow / White
YB	Yellow / Black
YG	Yellow / Green
WL	White / Blue
WB	White / Black
WG	White / Green
GR	Green / Red
O	Orange
WBr	White / Brown

1	Starter Switch
2	Stop Switch
3	Tachometer / Hourmeter
4	Buzzer
5	Lubricating Oil Low Pressure Alarm
6	Coolant High Temperature Alarm
7	Water in Sail Drive Seal Alarm
8	Battery Low Charge Alarm
9	Relay (for 2 station - Optional)
10	Fuse (3A)
11	Starter Switch
12	Stop Switch
13	Tachometer / Hourmeter
14	Buzzer
15	Lubricating Oil Low Pressure Alarm
16	Coolant High Temperature Alarm
17	Water in Sail Drive Seal Alarm
18	Battery Low Charge Alarm
19	Oil Pressure Meter
20	Coolant Temperature Meter
21	Air Heater (Optional)
22	Engine Stop Solenoid
23	Stop Relay
24	Starter Relay
25	Starter
26	Coolant High Temperature Switch
27	Lubricating Oil Low Pressure Switch
28	Alternator (Optional)
29	Alternator
30	Water In Sail Drive Seal Sensor (on Sail Drive)
31	Water in Sail Drive Seal Sensor Amplifier (Sail Drive Only)
32	Battery (Optional)
33	Battery
34	Oil Pressure Sensor (Optional)
35	Coolant Temperature Sensor (Optional)

Performance Curves



(Note) 1: Rating Condition : ISO 3046-1
Density of fuel : 0.86 g/cm³ at 15℃
Temperature of fuel : 25℃ at FO pump inlet
(Note) 2: hp = 0.7355 kW

Figure - 14

Controls

The 3JH4E uses a mechanical linkage to control engine speed and marine gear shifting. Electric stop solenoid is applied for engine stop.

Engine Speed Control (YPFS-CLH Fuel Injection Pump)

Recommended Remote Control Cable

Parameter	Data
Shift Cable Stroke	76.2 mm (3.0 in.)
Cable Connector Thread Size	M5* P0.8

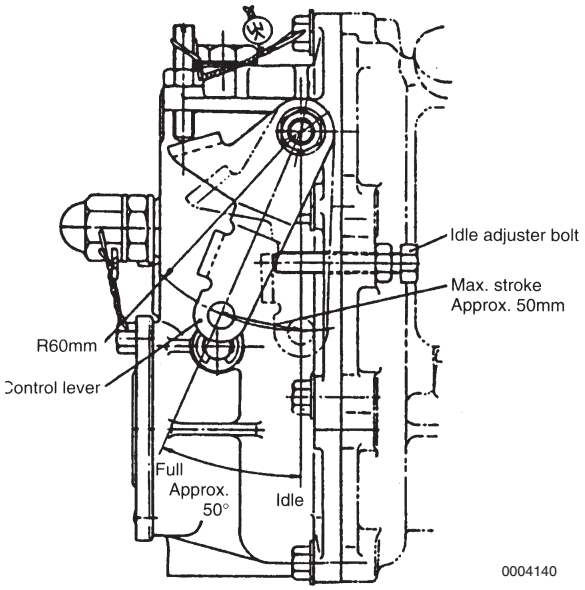


Figure - 15

Unit: mm

Mechanical Controls - KM35A / KM35P

Recommended Remote Control Cable

Parameter	Data
Shift Cable Stroke	76.2 mm (3.0 in.)
Cable Connector Thread Size	M5*0.8 (See **Figure - 16** and **Figure - 17**)

Shifting Lever Force (Reference Value)		
Shifting Direction	**Shift Lever Position at 56 mm (2.2 in.)**	**Remote Control Handle Position at 170 mm (cable length - 4 m [157.5 in.])**
Engaging Force at Engine 1000 min^{-1}	29.4 - 39.2 N (3 - 4 kgf) (6.6 - 8.8 lbf)	39.0 - 49.0 N (4 - 5 kgf) (8.7 - 11.0 lbf)
Disengaging Force at Engine 1000 min^{-1}	34.3 - 49.0 N (3.5 - 5 kgf) (7.7 - 11.0 lbf)	49.0 - 59.0 N (5 - 6 kgf) (11.0 - 13.2 lbf)

KM35A

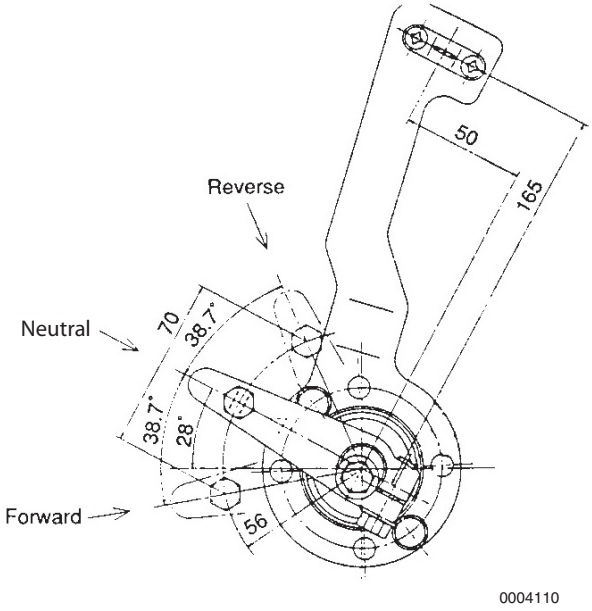


Figure - 16

KM35P

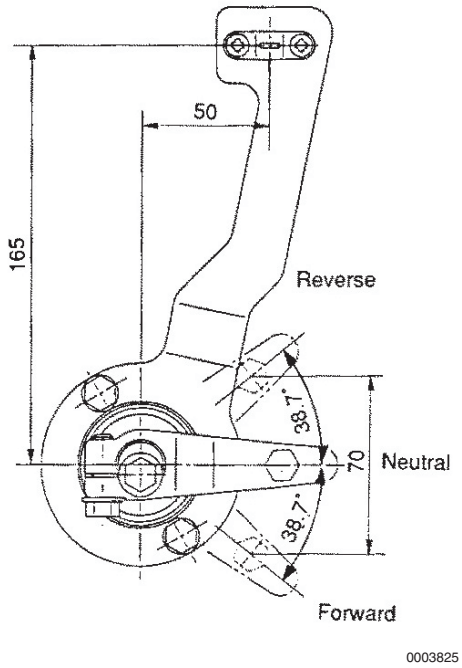


Figure - 17

Unit: mm

Mechanical Controls - SD40 / SD50

Recommended Remote Control Cable

Parameter	Data
Shift Cable Stroke	76.2 mm (3.0 in.)
Cable Connector Thread Size	10-32 UNF

Shifting Lever Force (Reference Value)	
Shifting Direction	**Shift Lever Position at 54 mm (2.1 in.)**
Engaging Force at Engine 850 min^{-1}	29.4 - 39.2 N (3 - 4 kgf) (6.6 - 8.8 lbf)
Disengaging Force at Engine 850 min^{-1}	34.3 - 44.1 N (3.5 - 4.5 kgf) (7.7 - 9.9 lbf)

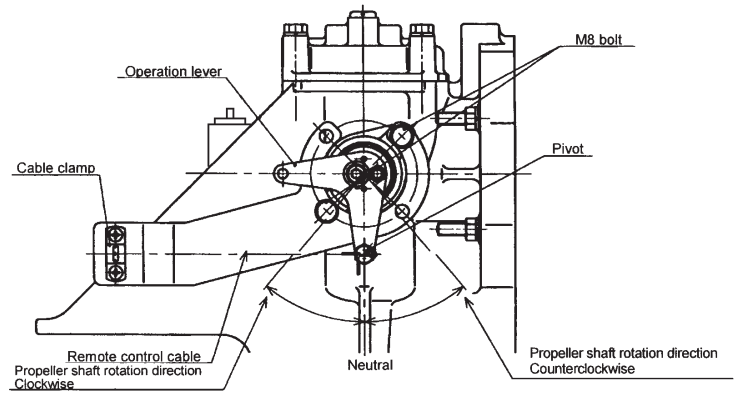


Fig. A Standard

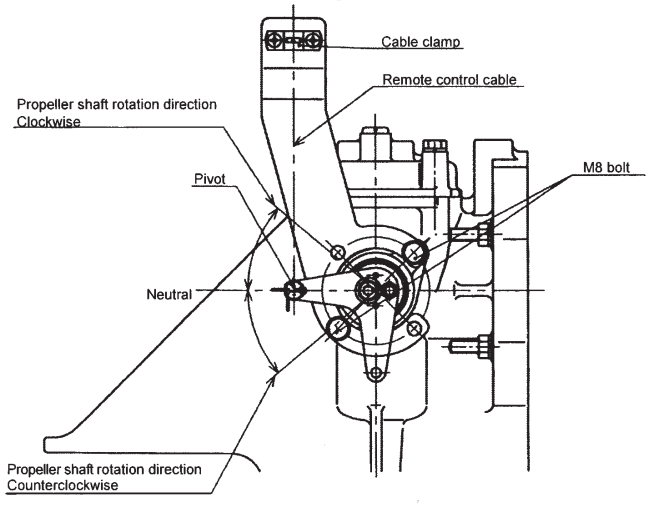


Fig. B When shift cable mounting board is directed upward by 90°

0004108

Figure - 18

Power Take-Off

The 3JH4E engine has power take-off (PTO) capabilities.

Operating Condition:

1. A-type shows an example with an overhang distance (L) of 30 mm (1.182 in.). When the overhang distance differs in value, calculate the capacity with the following formula. (Limit of distance is 100 mm [3.94 in.])

$$\text{Allowable Take-Off Output} = \frac{153\ \text{mm}}{(L + 169)\ \text{mm}} \times \text{kW}$$

L: Overhang distance (mm)
kW: Permissible Output

PTO Performance Curves

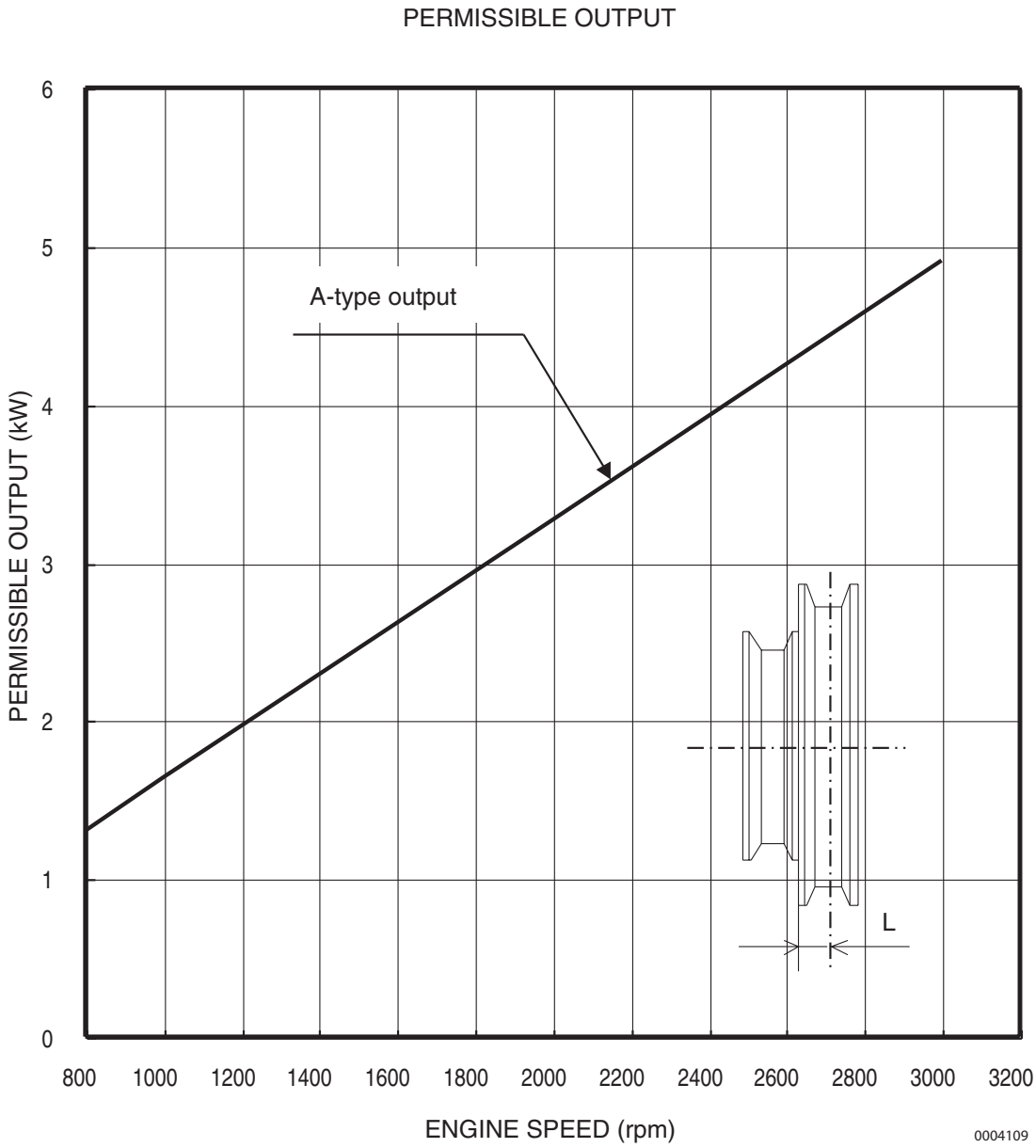


Figure - 19

Engine Mount Specifications

Engine Mounts (with KM35A / KM35P)

Parameter	Data
Position of Mount	(A), (B), (C), (D) 100, 150, 100, 150 (See **Figure - 20**)
Type of Flexible Mounts	Fixed-1
Flexible Mount ID and Quantity	ID 100 x 2 ID 150 x 2 (See **Figure - 21**)

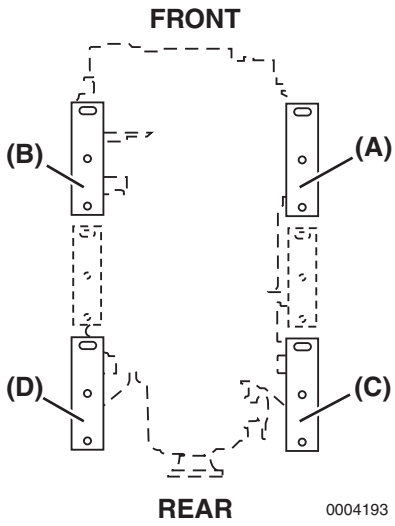
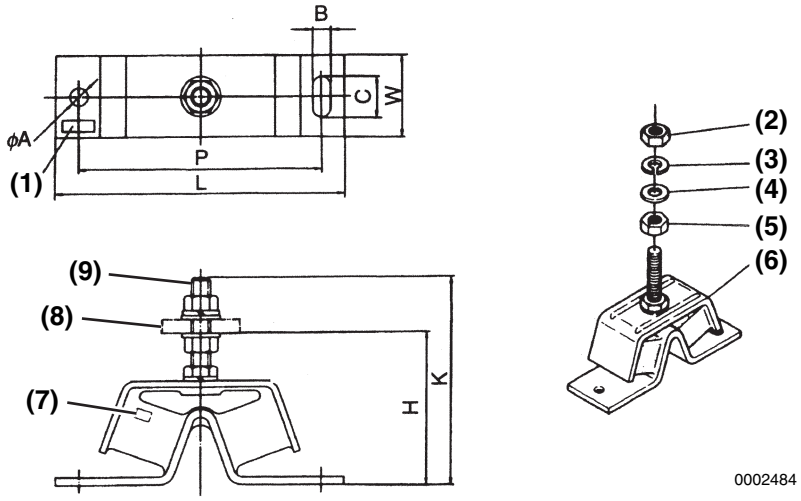


Figure - 20

Fixed-1 Type Engine Mount



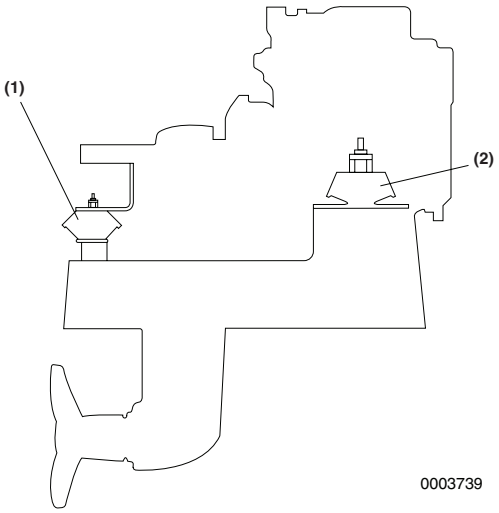
1. ID Mark (Only ID 300)
2. Lock Nut
3. Spring Washer
4. Flat Washer
5. Jack Nut
6. Rubber Mount
7. ID Mark
8. Engine Foot
9. T (Thread Diameter)

Figure - 21

ID	H		K	L	P	W	Diameter A	B	C	T Thread Diameter
	Min	Max								
100	100 mm 3.94 in.	110 mm 4.33 in.	145 mm 5.71 in.	206 mm 8.12 in.	174 mm 6.86 in.	60 mm 2.27 in.	12 mm 0.48 in.	12 mm 0.48 in.	30 mm 1.19 in.	M16 X P1.5
150	100 mm 3.94 in.	110 mm 4.33 in.	145 mm 5.71 in.	206 mm 8.12 in.	174 mm 6.86 in.	60 mm 2.27 in.	12 mm 0.48 in.	12 mm 0.48 in.	30 mm 1.19 in.	M16 X P1.5

Engine Mounts (with SD40 / SD50)

Parameter	Data
Position of Mount ( ) Flexible Mount ID	(A), (B) 230, 200 (See **Figure - 20**)
Flexible Mount ID and Quantity	ID 230 x 1 ID 200 x 2 (See **Figure - 21**)

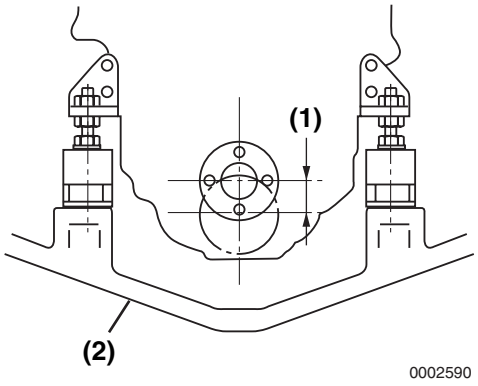


1. Sail Drive Side Flexible Mount (A)
2. Engine Side Flexible Mount (B)

Figure - 22

Flexible Mount Distortion

Parameter	Data
Static Distortion	4.0 mm (0.16 in.) approximate



1. Static Distortion
2. Viewed from Stern

Figure - 23

Notes:

1. Engine weight will compress mounting blocks by the static distortion value.
2. Engine outline drawing shows mounting blocks at original height.

Cold Starting Aids

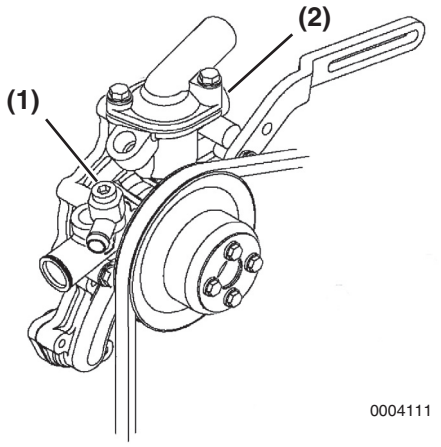
The 3JH4E engine is available with an air heater.

Air Venting for V-Drive Applications

The 3JH4E uses either a KM35A or KM35P marine gear or an SD50 sail drive, so no venting device is required.

Water Heater Tank Connection

The 3JH4E engine supports water heating tank connections for onboard head and galley operation.



1. Water from Tank
2. Water to Tank

Figure - 24

Optional Accessories

The following is a list of the 3JH4E optional accessories.

- New B-type panel (VDO)
- New C-type panel (VDO)
- New extension wire harness (4m, 6m, 10m)
- New connect wire harness for dual panel (CWN1)
- Meter sensor assembly
- Air heater (cold starting aid)
- Neutral safety switch (Marine Gear) (NS1)
- Battery switch (BS500)
- Side-mount single control head (MORSE: MV)
- Top-mount single control head (MORSE: MT3)
- Push-pull control cable (MORSE: 33C) (RC4, RC7)
- Propeller shaft half coupling, Slit (CSG1)
- Propeller shaft half coupling, Taper (CTG2, 3, 4, 5, and 6)
- Propeller shaft half coupling, Straight (CRG2)
- Lube oil evacuation pump (EPR1)
- Electric-type bilge pump, 12 V (BP1)
- Seacock (K3)
- Seawater strainer (SWF1)
- Fuel tank 30 L (8 gal) (FT1)
- Alternator, 12 V - 60A
- U-type, water mixing elbow

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